1. A recording method for using a plurality of coding tables to subject an input data word of p-bits to p-q modulation and to thereby obtain a code word of q-bits (q>p), in which said plurality of coding tables store the code words corresponding to the respective input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run length restriction rule even with the next code word coupled directly with the code word, and the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, said method comprising steps of: referring to said plurality of coding tables during modulation of said predetermined input data word; performing the DSV control; and outputting a recording signal generated by inserting a synchronous signal for decoding reproduction data into every predetermined number of code words in a string of the code words satisfying said run length restriction rule on a recording medium side or a transmission medium side,

wherein said p-bits are 8 bits, said q-bits are 15 bits, and said predetermined run length restriction rule stipulates that a minimum run length of a signal obtained by subjecting said code word to NRZI conversion excluding said synchronous signal is 3T and that a maximum run length is any one of 11T, 12T, 13T, and 14T.

2. The recording method according to claim 1 wherein when said predetermined input data word is modulated, the code word having a smaller absolute value is selected from

an absolute value of a DSV value obtained from the code word
using said specific coding table, and an absolute value of
a DSV value obtained from the code word modulated using said
other specific coding table, and the DSV control is
5   performed.

3. A recording method for using a plurality of coding
tables to subject an input data word of p-bits to p-q
modulation and to thereby obtain a code word of q-bits (q>p),
10   in which said plurality of coding tables store the code words
corresponding to the respective input data words, and state
information indicating the coding table for use in modulating
a next input data word to obtain a next code word satisfying
a predetermined run length restriction rule even with the
15   next code word coupled directly with the code word, and a
recording signal generated by inserting a synchronous signal
for decoding reproduction data into every predetermined
number of code words in a string of the code words satisfying
said predetermined run length restriction rule and to be
20   outputted is outputted on a recording medium side or a
transmission medium side, said method comprising steps of:
adding auxiliary information including a sector
address and a parity by a product code to said input data word
continuously inputted to constitute an ECC block; subjecting
25   said input data word in a format signal formatted in a
predetermined format with respect to the ECC block to the p-q
modulation to generate a string of code words satisfying said
predetermined run length restriction rule; and inserting the
synchronous signal including a bit pattern longer than a
30   maximum run length of said predetermined run length
restriction rule into every predetermined number of code
words to generate the recording signal.

4. The recording method according to claim 3 wherein
35   the specific coding table and the other specific coding table
in said plurality of coding tables are allotted to have an

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even/odd relation such that the number of "1" in each of the
code words stored corresponding to the respective
predetermined input data words is even in the specific coding
table and the number of "1" in the code word is odd in the
5   other specific coding table so as to enable a DSV control,
and the DSV control is performed with reference to said
plurality of coding tables, when said predetermined input
data word is modulated.

10   5. The recording method according to claim 3 wherein
the specific coding table and the other specific coding table
in said plurality of coding tables are allotted to have an
even/odd relation such that the number of "1" in each of the
code words stored corresponding to the respective
15   predetermined input data words is even in the specific coding
table and the number of "1" in the code word is odd in the
other specific coding table so as to enable a DSV control,
and the code word having a smaller absolute value is selected
from an absolute value of a DSV value obtained from the code
20   word modulated using said specific coding table, and an
absolute value of the DSV value obtained from the code word
modulated using said other specific coding table, and the DSV
control is performed, when said predetermined input data word
is modulated.
25

6. The recording method according to claim 3, further
comprising steps of setting an n (n≥1) consecutive ECC blocks
as a set; and repeating a processing for all rows of the
respective ECC blocks, said processing comprising steps
30   of successively switching and arranging respective r-th rows
of the respective ECC blocks and subsequently successively
switching and arranging respective (r+1)-th rows in such a
manner that respective first rows of the respective ECC
blocks of the set are successively arranged on said recording
35   medium or said transmission medium, and respective second
rows are successively recorded/arranged.

7. The recording method according to claim 3, further comprising steps of: setting two consecutive ECC blocks as a set; and repeating a processing for all rows of said two ECC blocks of each set, said processing comprising steps of alternately switching odd-numbered data of a first row of one ECC block of the set and even-numbered data of a first row of the other ECC block by a data unit and arranging the data on said recording medium or said transmission medium, and subsequently alternately switching even-numbered data of the first row of one ECC block and odd-numbered data of the first row of the other ECC block by the data unit and arranging the data on said recording medium or said transmission medium.

8. The recording method according to claim 3, further comprising steps of: dividing an x-rows y-columns data string constituted of said continuously inputted input data word and said auxiliary information into 1/m (m≥1) in a row direction and forming m x-rows y/m-columns sub blocks; first adding a first parity with a predetermined number of bytes to the respective sub blocks in a column direction; and subsequently adding a second parity with the predetermined number of bytes to the sub blocks including said first parity in the row direction so that said ECC block is constituted by the m sub blocks.

9. A recording apparatus which uses a plurality of coding tables to subject an input data word of p-bits to p-q modulation and to thereby obtain a code word of q-bits (q>p), and in which said plurality of coding tables store the code words corresponding to the respective input data words, and state information indicating the coding table for use in modulating a next input data word to obtain a next code word satisfying a predetermined run length restriction rule even with the next code word coupled directly with the code word, and a recording signal generated by inserting a synchronous

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signal for decoding reproduction data into every predetermined number of code words in a string of the code words satisfying said predetermined run length restriction rule and to be outputted is recorded in a recording medium, said apparatus comprising:

formatting means for adding auxiliary information including a sector address and a parity by a product code to said continuously inputted input data word to constitute an ECC block, and outputting a format signal formatted in a predetermined format to the ECC block;

modulation means for subjecting said input data word in said format signal outputted from said formatting means to the p-q modulation to generate a code word string satisfying said predetermined run length restriction rule, and inserting the synchronous signal including a bit pattern longer than a maximum run length of said predetermined run length restriction rule into every predetermined number of code words to generate the recording signal; and

recording means for recording said recording signal outputted from said modulation means in said recording medium.

10. The recording apparatus according to claim 9 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the DSV control is performed with reference to said plurality of coding tables, when said predetermined input data word is modulated.

11. The recording apparatus according to claim 9 wherein the specific coding table and the other specific

coding table in said plurality of coding tables are allotted
to have an even/odd relation such that the number of "1" in
each of the code words stored corresponding to the respective
predetermined input data words is even in the specific coding
5   table and the number of "1" in the code word is odd in the
other specific coding table so as to enable a DSV control,
and the code word having a smaller absolute value is selected
from an absolute value of a DSV value obtained from the code
word modulated using said specific coding table, and an
10   absolute value of the DSV value obtained from the code word
modulated using said other specific coding table, and the DSV
control is performed, when said predetermined input data word
is modulated.

15   12. A transmitting apparatus which uses a plurality of
coding tables to subject an input data word of p-bits to p-q
modulation and to thereby obtain a code word of q-bits (q>p),
and in which said plurality of coding tables store the code
words corresponding to the respective input data words, and
20   state information indicating the coding table for use in
modulating a next input data word to obtain a next code word
satisfying a predetermined run length restriction rule even
with the next code word coupled directly with the code word,
and a recording signal generated by inserting a synchronous
25   signal   for   decoding   reproducing   data   into   every
predetermined number of code words in a string of the code
words satisfying said predetermined run length restriction
rule and to be outputted is transmitted via a transmission
medium by radio or by a cable, said apparatus comprising:
30   formatting means for adding auxiliary information
including a sector address and a parity by a product code to
the continuously inputted input data word to constitute an
ECC block, and outputting a format signal formatted in a
predetermined format to the ECC block;
35   modulation means for subjecting said input data word
in said format signal outputted from said formatting means

to p-q modulation to generate a code word string satisfying said predetermined run length restriction rule, and inserting the synchronous signal including a bit pattern longer than a maximum run length of said predetermined run length restriction rule into every predetermined number of code words to generate the recording signal; and

transmission means for transmitting said recording signal outputted from said modulation means by said transmission medium.

13. The transmitting apparatus according to claim 12 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the DSV control is performed with reference to said plurality of coding tables, when said predetermined input data word is modulated.

14. The transmitting apparatus according to claim 12 wherein the specific coding table and the other specific coding table in said plurality of coding tables are allotted to have an even/odd relation such that the number of "1" in each of the code words stored corresponding to the respective predetermined input data words is even in the specific coding table and the number of "1" in the code word is odd in the other specific coding table so as to enable a DSV control, and the code word having a smaller absolute value is selected from an absolute value of a DSV value obtained from the code word modulated using said specific coding table, and an absolute value of the DSV value obtained from the code word modulated using said other specific coding table, and the DSV control is performed, when said predetermined input data word

is modulated.

15. A reproducing method for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 1 is recorded, or a transmission medium in which said recording signal generated using the recording method according to claim 1 is transmitted, said reproducing method comprising steps of:

detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium or said transmission medium; detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word $Ck-1$ following the code word Ck in a code word string following the synchronous signal; computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word $Ck-1$; demodulating an output data word $Dk-1$ corresponding to said code word $Ck-1$ with said case information detected from said code word $Ck-1$ and said state information of said code word Ck; repeating these steps in a time series order and obtaining an output data word string; and detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

16. The reproducing method according to claim 15 wherein the step of detecting said synchronous signal, subsequently detecting the auxiliary information including the sector address, an input data word (main data), and the parity based on the synchronous signal, reconstituting said ECC block, and reproducing said input data word comprises a step of including a part of a synchronous pattern of said

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synchronous signal in the data reconstituting said ECC block.

17. A reproducing method for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 3 is recorded, or a transmission medium in which said recording signal generated using the recording method according to claim 3 is transmitted, said reproducing method comprising steps of:

detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium or said transmission medium; detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word Ck-1 following the code word Ck in a code word string following the synchronous signal; computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word Ck-1; demodulating an output data word Dk-1 corresponding to said code word Ck-1 with said case information detected from said code word Ck-1 and said state information of said code word Ck; repeating these steps in a time series order and obtaining an output data word string; and detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

18. The reproducing method according to claim 17 wherein the step of detecting said synchronous signal, subsequently detecting the auxiliary information including the sector address, an input data word (main data), and the parity based on the synchronous signal, reconstituting said ECC block, and reproducing said input data word comprises a step of including a part of a synchronous pattern of said

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synchronous signal in the data reconstituting said ECC block.

19. A reproducing apparatus for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 1 is recorded, or a recording medium in which said recording signal generated using the recording apparatus according to claim 9 is recorded, said reproducing apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium; detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word $Ck-1$ following the code word Ck in a code word string following the synchronous signal; computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word $Ck-1$; demodulating an output data word $Dk-1$ corresponding to said code word $Ck-1$ with said case information detected from said code word $Ck-1$ and said state information of said code word Ck; repeating these in a time series order and obtaining an output data word string; and detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

20. The reproducing apparatus according to claim 19 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and

said input data word is reproduced.

21. A reproducing apparatus for reproducing data from a recording medium in which a recording signal generated using the recording method according to claim 3 is recorded, or a recording medium in which said recording signal generated using the recording apparatus according to claim 9 is recorded, said reproducing apparatus comprising:

reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said recording medium; detecting case information indicating a possible state of a code word C_k to a plurality of coding tables based on a zero run length on an LSB side of a code word C_{k-1} following the code word C_k in a code word string following the synchronous signal; computing state information of the coding table used in coding said code word C_k based on said case information detected from said code word C_{k-1}; demodulating an output data word D_{k-1} corresponding to said code word C_{k-1} with said case information detected from said code word C_{k-1} and said state information of said code word C_k; repeating these in a time series order and obtaining an output data word string; and detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

22. The reproducing apparatus according to claim 21 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and

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said input data word is reproduced.

    '   23. A receiving apparatus for receiving a transmission medium in which a recording signal generated using the recording method according to claim 1 is transmitted, or a transmission medium in which said recording signal generated using the transmitting apparatus according to claim 12 is transmitted, said receiving apparatus comprising:

    reproduction signal processing means for: detecting a synchronous signal including a bit pattern longer than a maximum run length of a predetermined run length restriction rule from a reproduction signal obtained by reproducing data from said transmission medium; detecting case information indicating a possible state of a code word Ck to a plurality of coding tables based on a zero run length on an LSB side of a code word $Ck-1$ following the code word Ck in a code word string following the synchronous signal; computing state information of the coding table used in coding said code word Ck based on said case information detected from said code word $Ck-1$; demodulating an output data word $Dk-1$ corresponding to said code word $Ck-1$ with said case information detected from said code word $Ck-1$ and said state information of said code word Ck; repeating these in a time series order and obtaining an output data word string; and detecting auxiliary information including a sector address and a parity by a product code from said output data word string based on said synchronous signal to reconstitute an ECC block, and reproducing signals obtained thereby.

    24. The receiving apparatus according to claim 23 wherein a part of a synchronous pattern of said synchronous signal is included in the data reconstituting said ECC block, when said synchronous signal is detected, subsequently the auxiliary information including the sector address, an input data word (main data), and the parity are detected based on the synchronous signal, said ECC block is reconstituted, and

said input data word is reproduced.

25. A receiving apparatus for receiving a transmission
medium in which a recording signal generated using the
recording method according to claim 3 is transmitted, or a
transmission medium in which said recording signal generated
using the transmitting apparatus according to claim 12 is
transmitted, said receiving apparatus comprising:

reproduction signal processing means for: detecting a
synchronous signal including a bit pattern longer than a
maximum run length of a predetermined run length restriction
rule from a reproduction signal obtained by reproducing data
from said transmission medium; detecting case information
indicating a possible state of a code word C_k to a plurality
of coding tables based on a zero run length on an LSB side
of a code word C_{k-1} following the code word C_k in a code word
string following the synchronous signal; computing state
information of the coding table used in coding said code word
C_k based on said case information detected from said code word
C_{k-1}; demodulating an output data word D_{k-1} corresponding to
said code word C_{k-1} with said case information detected from
said code word C_{k-1} and said state information of said code
word C_k; repeating these in a time series order and obtaining
an output data word string; and detecting auxiliary
information including a sector address and a parity by a
product code from said output data word string based on said
synchronous signal to reconstitute an ECC block, and
reproducing signals obtained thereby.

26. The receiving apparatus according to claim 25
wherein a part of a synchronous pattern of said synchronous
signal is included in the data reconstituting said ECC block,
when said synchronous signal is detected, subsequently the
auxiliary information including the sector address, an input
data word (main data), and the parity are detected based on
the synchronous signal, said ECC block is reconstituted, and

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said input data word is reproduced.

27. A recording medium wherein a recording signal generated using the recording method according to claim 1 or said recording signal generated using the recording apparatus according to claim 9 is recorded.

28. A recording medium wherein a recording signal generated using the recording method according to claim 3 or said recording signal generated using the recording apparatus according to claim 9 is recorded.

29. A transmission medium wherein a recording signal generated using the recording method according to claim 1 or said recording signal generated using the transmitting apparatus according to claim 12 is transmitted therethrough.

30. A transmission medium wherein a recording signal generated using the recording method according to claim 3 or said recording signal generated using the transmitting apparatus according to claim 12 is transmitted therethrough.